The Three sources of Gas in the Comae of Comets

A. A. de Almeida,[1] W. F. Huebner,[2,3] J. Benkhoff,[2] D. C. Boice,[2] and D. P. Singh[1]

[1] Instituto de Astronômico e Geofísico, Universidade de Saõ Paulo, Saõ Paulo, SP, Brasil
[2] Southwest Research Institute, San Antonio, TX, USA
[3] Jet Propulsion Laboratory, Pasadena, CA, USA

Surface water ice on a comet nucleus is the major source of coma gas. Dust, entrained by coma gas, fragments and vaporizes, forming a second, distributed source of coma gas constituents. Ices species more volatile than water ice below the surface of the nucleus are a third source of coma gas. Vapors from these ices, produced by heat penetrating into the nucleus, diffuse through pores outward into the coma. The second and third sources provide minor, but sometimes easily detectible, gaseous species in the coma. We present mixing ratios of observed minor coma constituents relative to water vapor as a function of heliocentric and cometocentric distances and compare these ratios with model predictions, assuming the sources of the minor species are either coma dust or volatile ices in the nucleus.